



Name: _____ Date: _____ Group: _____

NEXT STEP INQUIRY

Access Prior Knowledge

1. Describe a proton.

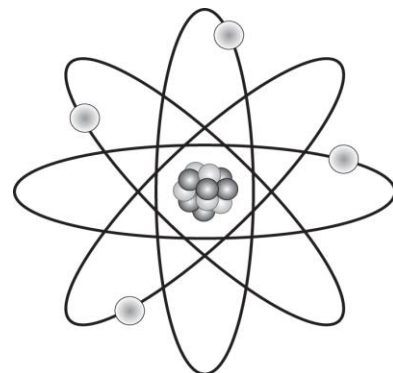
2. Describe a neutron.

3. Describe an electron.

Background

Atoms are the smallest units of elements. They are the building blocks of everything in the universe. They were first believed to exist thousands of years ago, but until recently, we have not had the technology to learn about them.

Scientists use a very powerful microscope, called an electron microscope, to see atoms. This type of microscope is so powerful it can magnify items up to 10,000,000 times their size. This is how we know that if you made a very small dot with your pencil on a paper, you could fit four billion atoms inside it! Atoms are tiny!



So, how do we study something so small? Scientists use models to learn more about things that they are not able to directly study. Models allow scientists to look at a simulated atom that is large enough to investigate and discuss even sub-atomic particles. Models provide the ability to communicate with other scientists (and students!) about how atoms interact.

What do you think? What best represents an atom, a 2-D model or a 3-D model?

You will describe the structure of atoms, including the masses, the electrical charges, the locations of protons and neutrons in the nucleus, and electrons in the electron cloud in this activity.

NEXT STEP INQUIRY

Begin the Investigation

1. My Question of Inquiry:

2. The hypothesis:

3. My prediction:

4. What is the independent variable (also known as the manipulated variable), if applicable?

5. What is the dependent variable (also known as the responding variable), if applicable?

6. Is a control sample or group needed in this investigation? *Explain.*

7. What materials, equipment, and technology will I need for this investigation?

8. What safety precautions must I take in this investigation?

9. Carry out this investigation using the following procedure. *Record your procedure in your lab journal.*

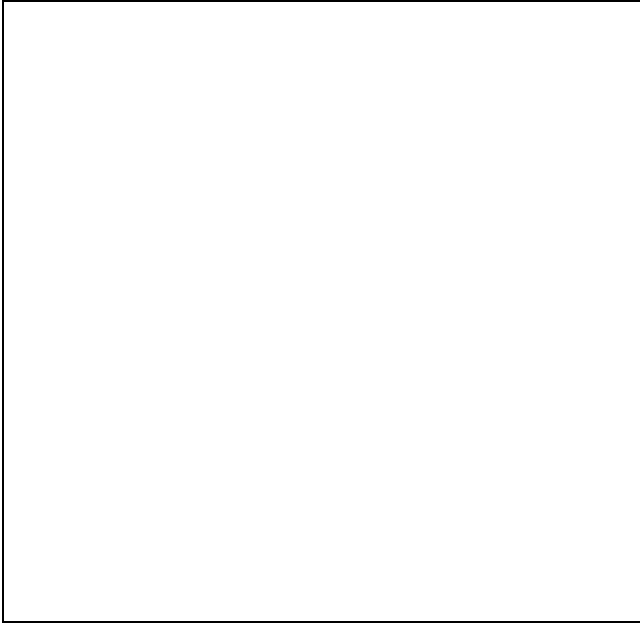
NEXT STEP INQUIRY

Continue the Investigation

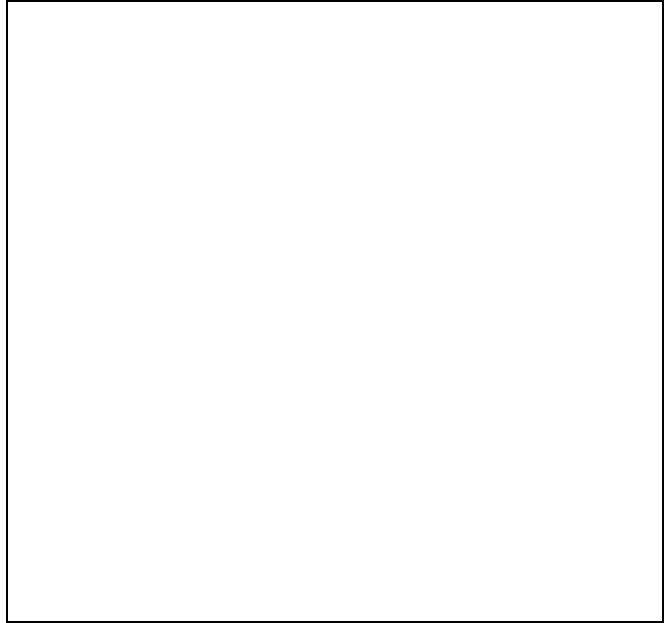
COLLECT, RECORD, AND ORGANIZE DATA

I will use the space below to draw representations of the four elements that I will model. *Show the protons, neutrons, and electrons that would be present in a neutral atom of each element.*

Hydrogen Atom Diagram



Helium Atom Diagram



Lithium Atom Diagram



Beryllium Atom Diagram



NEXT STEP INQUIRY

Analyze Data

Use the data you organized to answer the following question:

1. What are the advantages of my 2-D model when compared to the 3-D models?

2. When would scientists most likely use 2-D models to communicate information about the structure of atoms? *Explain.*

3. What are the advantages of my 3-D model when compared to the 2-D models?

4. When would scientists find a 3-D model more useful to communicate information about the structure of atoms? *Explain.*

5. What can I do to make my model more realistic?

NEXT STEP INQUIRY

Reflections and Conclusions

1. Is the hypothesis supported or not supported by data? *Explain.*

2. How did the results reveal a relationship between the dependent variable and independent variable, if applicable?

3. Where could errors have been made while collecting or organizing data?

4. What type of data did I collect—qualitative or quantitative? *Explain.*

5. What can I conclude from this investigation?

6. What would I do differently if I were to conduct this experiment again?
